

Nov. 18, 1952

S. MAZER

2,618,031

CENTRIFUGAL CASTING MACHINE

Filed June 24, 1948

3 Sheets-Sheet 1

FIG. 1.

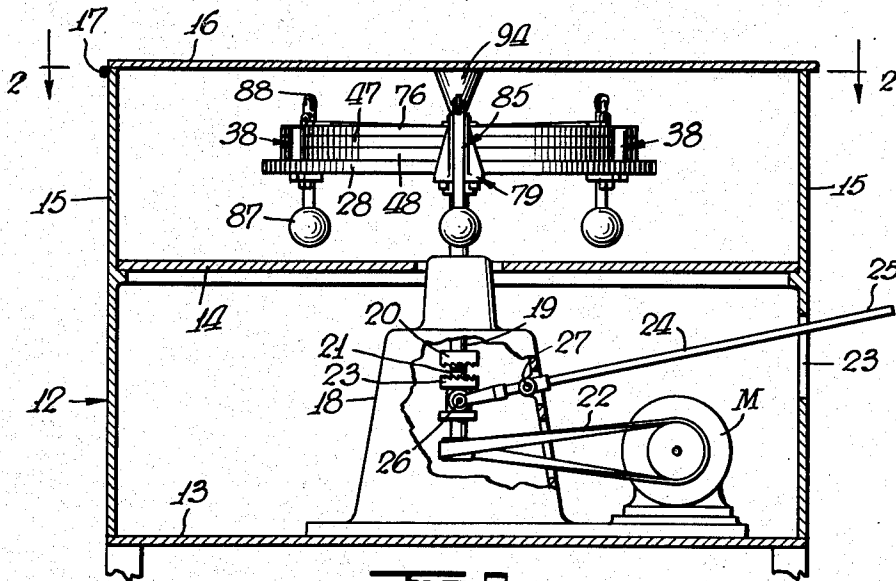
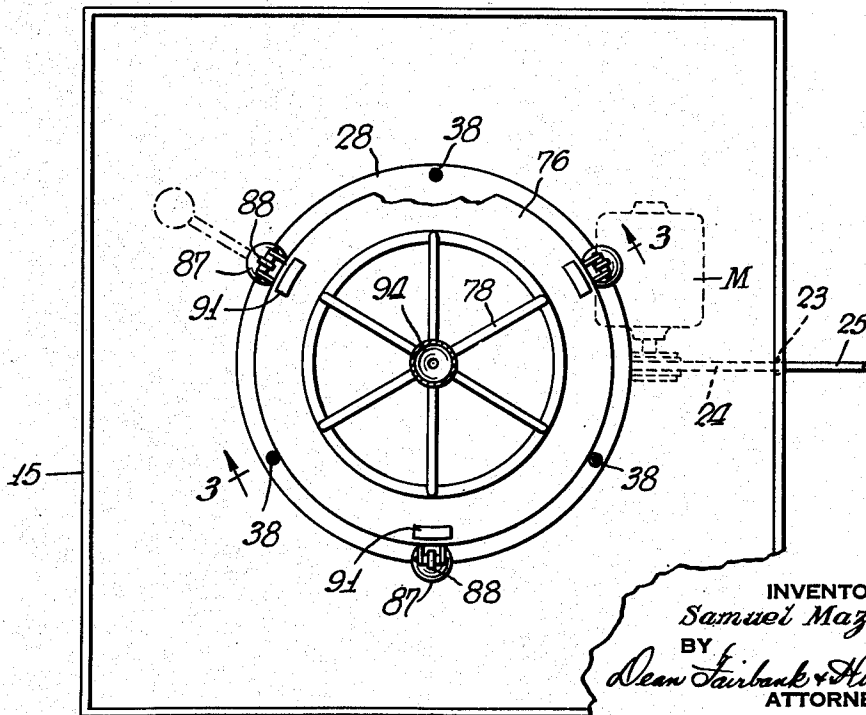


FIG. 2.



INVENTOR
Samuel Mazer
BY *Dean Fairbank & Hirsch*
ATTORNEYS

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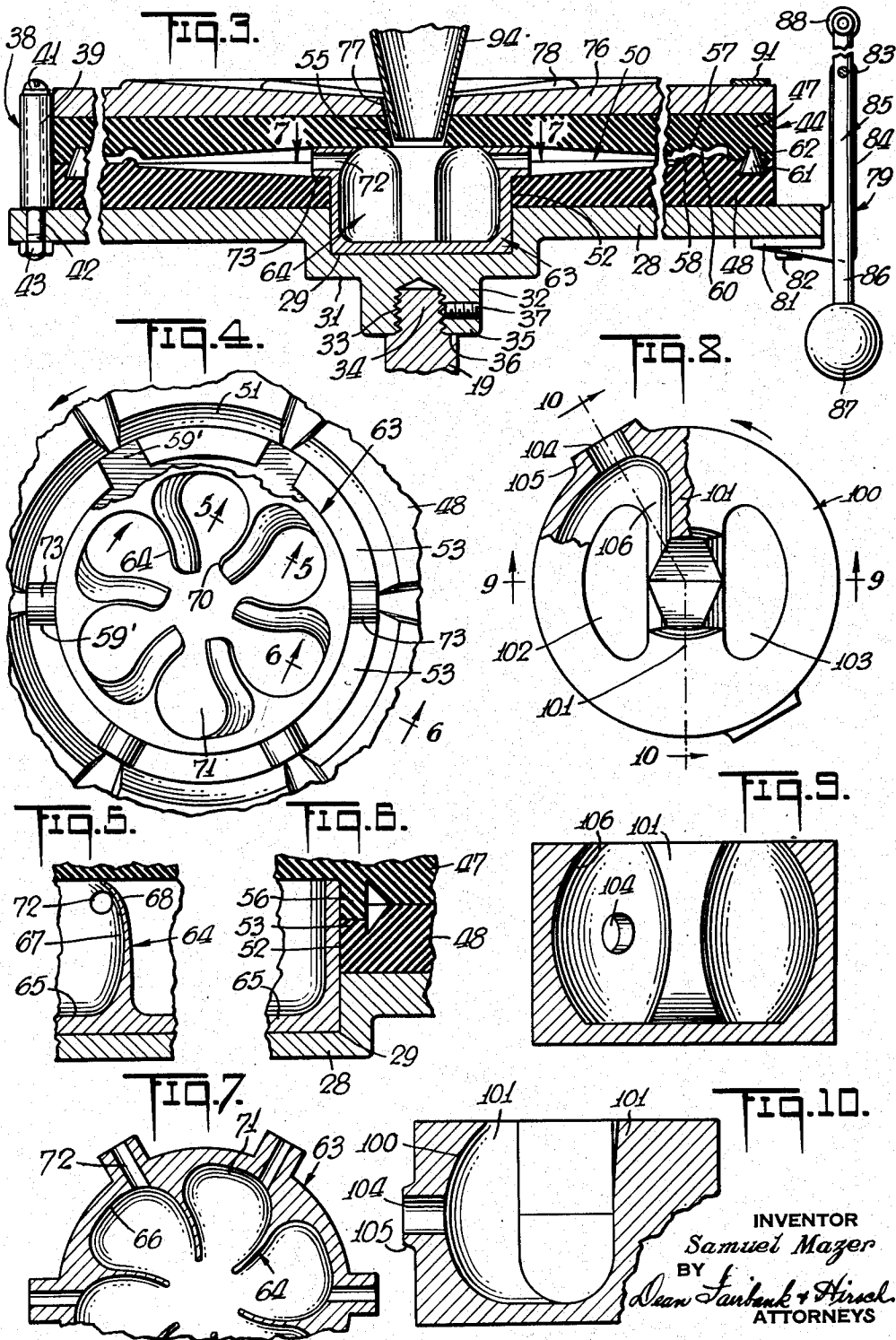
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Filed June 24, 1948

3 Sheets-Sheet 2



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3 Sheets-Sheet 3

FIG. 11.

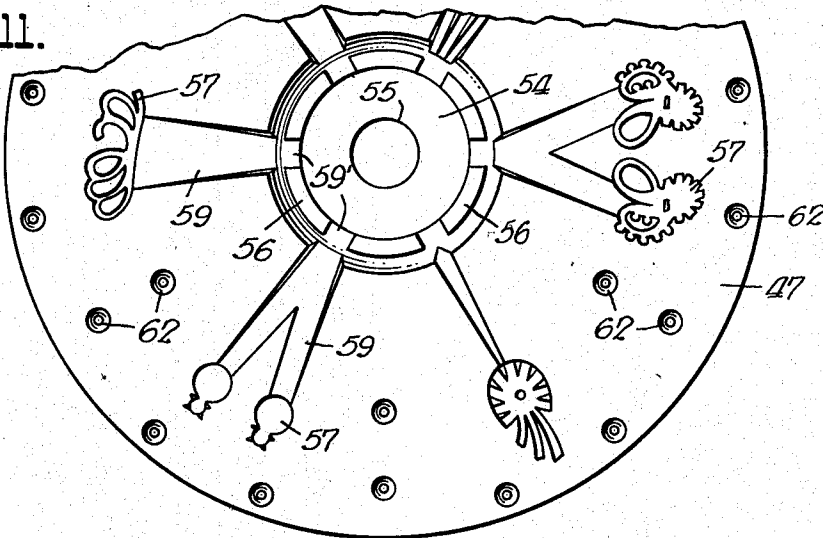
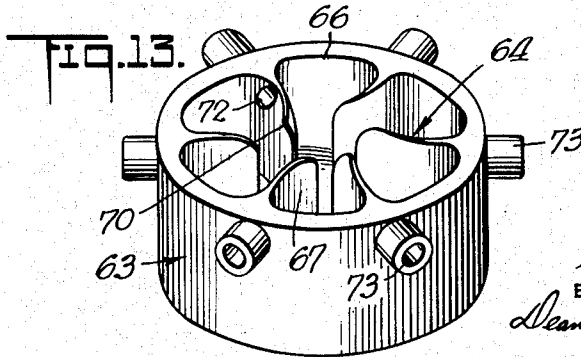
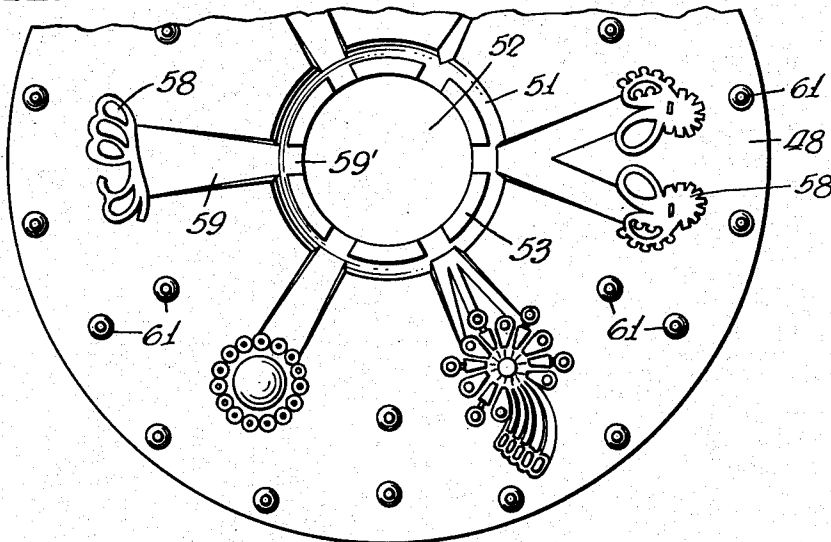


FIG. 12.



INVENTOR
Samuel Mazer
BY *Dean Fairbank & Hirsch*
ATTORNEYS

UNITED STATES PATENT OFFICE

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CENTRIFUGAL CASTING MACHINE

Samuel Mazer, New York, N. Y., assignor to Mazer Bros. Inc., a corporation of New York

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1 Claim. (Cl. 22—65)

1

This invention relates to centrifugal casting machines, more particularly for casting intricate forms in rubber or plastic molds.

In casting machines of the type where the molten casting material, usually metal, is slowly fed into the mold as the latter is rotated, there is a tendency for the metal as it is thrown through the passageways leading into the mold cavities by centrifugal action, to cool unevenly thereby not filling such mold cavities completely and possibly blocking the passageways thereto with the result that the article produced is imperfect.

It is accordingly among the objects of the invention to provide a machine in which the molten metal is reliably delivered to the mold cavity to fill the entire volume of the same completely, without air bubbles or voids therein and with complete conformation to the minutest details thereof and without blocking the passageways leading to such mold cavity by premature congealing of the molten metal in its traverse of the passageways.

Another object is to provide a machine of the above type which is simple, relatively inexpensive and rugged in construction, which requires no expert skill for the installation or operation thereof, which is thoroughly reliable under all conditions of use, which has but few parts that are likely to become deranged and which may readily be disassembled for maintenance and repair.

Another object is to provide a relatively inexpensive casting receptacle or cup which has no relatively moving parts whatsoever and so is not subject to jamming or derangement and which may readily be incorporated in a centrifugal casting machine and by means of which, upon rotation of said cup, a quantity of molten metal may be segregated into individual charges and reliably injected by the centrifugal force created by which rotation into a plurality of mold cavities associated respectively with each of said charges completely to fill the volume of such cavities.

According to the invention, a central depression for receiving a quantity of molten metal is provided in a conventional, substantially disc shaped rotatable mold provided with a plurality of mold cavities peripherally distributed about said central depression and in which the article is formed. Preferably the central depression is provided with a plurality of deflecting baffles associated respectively with radiating passageways leading respectively from said central depression into said mold cavities, to segregate the molten metal in the central depression into a plurality of individual charges or gobs of metal, associated

2

respectively with said passageways and to guide such metal through said passageways, whereby upon almost instant acceleration of said mold to full speed, said individual charges will be hurled through said passageways into the associated mold cavities by the high centrifugal force engendered by such rotation.

In a preferred embodiment herein shown to illustrate the invention, the mold has a central socket therein which accommodates a casting cup of heat resistant material desirably of metal having a higher melting point than the metal used in forming the article. The casting cup has a plurality of radiating transverse outlets in the side wall thereof aligned respectively with the passageways in the mold leading into the mold cavities, and is provided with a plurality of curved radiating vanes, associated respectively with each of said outlets, and which serve to segregate the molten metal in the casting cup into a plurality of individual charges, associated respectively with said outlets and to guide said molten metal through said outlets upon rotation of said mold and casting cup therein.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a side elevational view of the machine partly in cross section, with parts broken away,

Fig. 2 is a plan view of the machine taken along line 2—2 of Fig. 1,

Fig. 3 is a fragmentary sectional view on a larger scale taken along line 3—3 of Fig. 2,

Fig. 4 is a plan view of one embodiment of a casting cup positioned in a mold,

Fig. 5 is a sectional view taken along line 5—5 of Fig. 4,

Fig. 6 is a view similar to Fig. 5 taken along line 6—6 of Fig. 4,

Fig. 7 is a fragmentary sectional view taken along line 7—7 of Fig. 3,

Fig. 8 is a plan view with parts broken away of another embodiment of a casting cup,

Fig. 9 is a sectional view taken along line 9—9 of Fig. 8,

Fig. 10 is a view similar to Fig. 9 taken along line 10—10 of Fig. 8,

Fig. 11 is a fragmentary plan view on a larger scale of one portion of the mold,

Fig. 12 is a view similar to Fig. 11 of the other portion of the mold, and

Fig. 13 is a perspective view of one embodiment of the casting cup.

Referring now to the drawings, the centrifugal casting machine comprises a frame 12 having a bed 13 and a horizontal shelf 14 thereabove. The

3

side walls 15 of the machine extend above the shelf 14 and mount a cover or lid 16 pivotally connected to one of the side walls 15 as at 17.

Mounted on the bed 13 is a housing 18 which rotatably mounts an upright shaft 19, the upper end of which extends through shelf 14. The lower end of shaft 19 is connected by means of a clutch 21 comprising normally disengaged members 20 and 23 (which clutch as it is conventional in construction will not be further described) and a pulley and belt transmission 22 to a heavy duty electric motor M desirably of about one horsepower, mounted on the bed 13. It is to be understood that other types of transmission could be used, the one shown and described being merely illustrative of a preferred type.

In order to engage clutch members 20 and 23 so that shaft 19 which is normally idle may be driven by the motor M, a clutch lever 24 is provided, connected to the lower position 23 of the clutch 21 as at 26, pivotally mounted on the housing as at 27 and extending at its free end 25 through an opening 23 in the side wall 15 of the frame.

Mounted on the upper end of shaft 19 is a circular plate or casting head 28 desirably of steel, having a cup shaped depression 29 in the center thereof. The underface of the depression 29 has a hub 32 integral therewith, having a screw threaded socket 33 which is screwed upon the threaded upper end 34 of shaft 19 until contact is made with the end 35 of the hub against a shoulder 36 on the shaft, as shown in Fig. 3. A set screw 37 locks the hub to the shaft 19.

A mold 44 is positioned on the upper face of casting head 28, and accurately centered thereon by means of upright spacers 38, three of which are illustratively shown near the periphery of the casting head and equally spaced thereon. The spacers 38, as shown in Fig. 3, each comprises a sleeve 39 through which a bolt 41 extends, the latter passing through an opening 42 in the casting head 28 and secured by means of a nut 43.

Mold 44 comprises two circular superposed portions 47 and 48, the upper portion being conventionally known as the cope and the lower portion the drag, which portions may be formed out of plaster or rubber, the latter being preferable on account of its flexibility to facilitate removal of the finished casting.

The drag 48 of the mold 44 has a large central circular recess 51 therein with a relatively large opening 52 therethrough, and is provided with an annular hub 53 around said opening 52, the upper edge of said hub being below the upper face of the cope 47, as shown in Fig. 6. The cope 47 of the mold also has a large central circular recess 54 therein with a relatively small opening 55 therethrough and is provided with an annular hub 56 near the periphery of said recess 54 which will be aligned with and seat on annular hub 53 when the cope 47 and drag 48 are in juxtaposition. The cope 47 and drag 48 have complementary article forming depressions 57 and 58 therein positioned respectively in opposing faces thereof and radially arranged near the periphery thereof, which depressions form the mold cavities 60 when the cope 47 and drag 48 are superposed. In order to ensure proper registration of the complementary article forming depressions 57 and 58, lugs 61 are provided in one mold portion, illustratively the drag 48, which enter corresponding recesses 62 in the cope 47. A plurality of grooves 59 is provided, respectively radiating outwardly from each of the article forming

4

depressions to the central portion of the cope and drag respectively, said grooves passing respectively through associated notches 59' in the hubs 53 and 56, the grooves forming passageways 59 when the mold portions are superposed, which serve to convey the molten metal to the mold cavities in the manner hereinafter described.

Positioned in the opening 52 in recess 51 of the drag 48 and extending through said opening for seating in cup shaped depression 29 in plate 28, is a substantially cylindrical casting receptacle or cup 63, made of heat resistant material desirably of metal, such as brass, having a higher melting point than the metal used in forming the article. The cup 63 has a plurality of substantially vertical deflector baffles or vanes 64 therein, preferably integral therewith, and desirably equally spaced in said cup, said vanes extending from the floor 65 of said cup to the top thereof and generally radially arranged, extending inwardly from the wall 66 towards the center of the cup. Each of the vanes 64 has a concave face 67 with a greater curvature near the top thereof as at 68, and the edge of each of said vanes at the top thereof near the center of said cup is bent outwardly as at 70 from the face of said vane, the curved face thus acting as a scoop in the manner hereinafter described.

It is apparent from the above description that each pair of successive vanes will form a pocket 71, and an outlet 72 is provided for each of said pockets, extending transversely through the wall 66 of the cup near the upper edge thereof adjacent to and aligned with an associated vane. Each outlet 72 is provided with a nozzle 73, the latter extending radially outward from the wall 66 of the cup and spaced therealong so as to fit into the notches 59' in hubs 53 and 56 and thereby to be securely clamped between the cope 47 and drag 48, in the socket formed by recesses 54 and 51 when the latter are in juxtaposition.

To retain the mold 44 and casting cup 63 securely on the casting head 28, a substantially circular clamp plate or disc 76 is provided, positioned on top of the mold 44 and centered thereon by means of spacers 38. A central opening 77 is provided in plate 76 to afford access to the casting cup 63 in order that the latter may be charged with molten metal in the manner hereinafter described. To strengthen the clamp plate, the latter is provided with radial ribs 78 on the top thereof. Plate 28 is provided with a plurality of substantially L-shaped brackets 79, three of which are illustratively shown. The lower leg 81 of each of the brackets is affixed to the under face of plate 28 by screw 82 so that the brackets are equally spaced along the periphery thereof. The upper end 83 of each of the upright legs 84 of brackets 79, which extends slightly above the clamp plate 76, has a lever 85 pivoted thereto near its upper end. The lower end 86 of the lever 85 which normally extends beneath the plate 28 has a weight 87 affixed thereon, and a roller 88 is provided at the upper end of the lever 79. As the clamp plate is preferably formed out of aluminum, a plurality of wear strips 91 are affixed to the top thereof and spaced along the rim aligned respectively with said levers 79, so that when the levers 79 are respectively pivoted by centrifugal action, the rollers 88 will contact an associated wear strip to prevent injury to the clamp plate, and retain the latter and the mold therebeneath on plate 28.

The cover or lid 16 of the machine which is normally closed during the casting operation, has a

5

funnel 94 associated therewith which extends through the opening 77 in clamp disc 76 and opening 55 in cope 47 to enable molten metal to be poured into the casting cup.

To operate the machine, the lower portion of the mold or drag 48 is first positioned on the casting head 28 between spacers 38. Casting cup 63 is then inserted through opening 52 in drag 48 into cup shaped depression 29, the nozzles 73 being seated respectively in the notches 59' in hub 53. The cope 47 of the mold is then placed over the drag 48 so that complementary article forming depressions 57, 58 are aligned. In this position the notches 59' in hub 56 will respectively straddle nozzles 73, the notches 59' thus serving to prevent displacement of the casting cup 63 with respect to the mold 44. The clamp plate 76 is then placed on the top of the mold and lid 16 is closed.

The operator then turns on the heavy duty motor M which rotates at a relatively high speed of approximately 1700 R. P. M. As clutch 21 is normally in inactive position, shaft 19 will not rotate. The operator then pours a measured quantity of molten metal into funnel 94 to load casting cup 63, and thereupon moves clutch lever 24 to actuate shaft 19. The torque of the motor M which is suddenly applied to shaft 19 through transmission 22 will cause almost instant acceleration of the casting head 28, mold 44 with casting cup 63 therein, and clamp plate 76, and set such parts into rapid rotation. The centrifugal force engendered by such rapid rotation will cause weights 87 to fly outwardly, thereby pivoting lever 79 to force rollers 88 against wear strips 91 securely to hold the clamp plate 76, mold 44 with casting cup 63 therein on casting head 28.

As the casting cup 63 which contains the molten metal is almost instantly brought to full speed and very rapidly rotated in a counter-clockwise direction, as shown in Fig. 4, the molten metal in each pocket 71 will be forced in a clockwise direction against its associated vane 64. The centrifugal component of force engendered by the rotation will cause the metal in each pocket to be hurled outwardly along the curved face 67 of each vane, which acts as a guide or channel, through outlets 72, nozzles 73 and passageways 50 into the mold cavities 60, completely and rapidly to fill the latter with complete definition of detail. As the mold is rotating at high speed throughout the entire time that the molten metal is passing through the passageways, there is no danger of the metal cooling off in the passageways and blocking the latter. As the mold cavities are almost instantly filled when the mold is rotated, the molded article will cool evenly with no danger of voids forming therein or of lack of definition in design which might occur if the metal filled the mold cavities more slowly.

Although the casting cup is illustratively shown with six equally spaced vanes to fill six distinct mold cavities, it is of course to be understood that more or less vanes could be provided to fill a corresponding number of mold cavities, and that such vanes could be unequally spaced so that the amount of molten metal in the pockets 71 between successive vanes would be substantially equal to the volume of the particular mold cavity associated therewith. Thus when it is desired to form a plurality of articles in a single casting operation and such articles are of different size, only a slightly greater quantity of molten metal

6

need be used than will completely fill the volumes of the respective mold cavities.

In Figs. 8 to 10, a casting cup 100 is shown with but two diametrically opposed vanes 101 therein forming two pockets 102 and 103. Each vane 101 has a curved face 106 forming a guide channel to an outlet 104 associated therewith, said outlets each having a nozzle 105. As the operation of this casting cup is identical with that of casting cup 63 above described, no further description thereof is necessary.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claim, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

A centrifugal casting machine comprising a rotatable shaft, drive means for said shaft, a horizontal casting head centered on and affixed to said shaft, a mold on said casting head comprising a pair of superposed portions each having complementary article forming depressions therein forming the mold cavities, said mold having a central socket therein and complementary grooves in each of said superposed portions extending radially from each of said mold cavities to said central socket in said mold, each of said superposed portions having an annular hub encompassing said central socket, said hubs having complementary notches therein aligned with said radiating grooves, a substantially cup-shaped receptacle in said central socket, said receptacle having a plurality of spaced vanes extending generally radially inward from the wall of said receptacle and defining a central socket, one of the faces of each of said vanes being concave, a plurality of radiating nozzles on the outer surface of said wall aligned respectively with said radiating notches, said nozzles each having a bore there-through aligned respectively with the concave faces of said vanes, said concave faces each forming a guide conformation directed to said nozzles respectively, means to hold said mold in fixed position on said casting head and means suddenly to apply torque to said shaft almost instantly to accelerate the latter to full speed.

SAMUEL MAZER.

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